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Making the Most of Single Switch Technology: A Primer

A stroll through any local toy store reveals that children without disabilities embark on their foray into the use of single switch technology when they are very young. A wide variety of commercially available toys are activated by single switches. For example, PLAYSKOOL's Talking Mr. Potato Head is a toy whose hat serves as a single switch. When depressed, Mr. Potato Head recites lines from the movie Toy Story-2. Another example is Elmo's Boom Box by Fisher Price. This toy has three buttons which each serve as a single switch. When depressed, the switches randomly play segments of children's songs.

These same kinds of toys are often used as tools for helping children with disabilities increase their independence and control over their environment. They can be used in the context of instruction to promote the acquisition of skills across all domains of development. For example, Elmo's Boom Box can be used during a small group activity to promote the development of cognitive skills (e.g., establishing cause-effect relationships), provide opportunities for development of purposeful motor skills (e.g., reaching, pressing), and enhance social and play skills (e.g., facilitate interactions with peers and adults).

Although many toys are available that use single switch technology, they may not meet the specific needs of all young children with disabilities. For example, consider a child with significant physical disabilities who is unable to press the buttons on Elmo's Boom Box. Alternatively, consider a child with severe cognitive and physical disabilities who requires multiple opportunities to acquire new skills but whose preferences change frequently making it difficult to create enough opportunities for learning to occur. In instances such as these, caregivers may consider purchasing or making their own single switches that can be used to enable young children to interact with a variety of toys and activities. The purpose of this paper is to discuss and provide examples illustrating how one specific type of assistive technology (AT), single switches, can benefit young children with disabilities.

Obtaining Single Switches

Single switches come in all shapes and sizes and can be activated via any number of purposeful motor movements. Some switches are activated by pulling, some by pushing. Others are activated by using your mouth to sip and puff (in much the same way one would use a straw). If a child is able to move a body part, and he/she can replicate that movement, then a switch can be obtained that utilizes that movement (Glennan & Decoste, 1997).

Single switches can be purchased from a variety of manufacturers. Table 1 provides a list of some of the manufacturers of commercially available switches that have been used by this author. Interested readers can contact these manufacturers to request copies of catalogs. An alternative to purchasing a commercially available switch is to use a homemade switch. Homemade switches are easy and inexpensive to make using materials found at electronic supply stores or the electronics department of home improvement centers. Interested readers will discover a number of books and articles that have been published that describe how to make switches (Burkhart, 1980; Burkhart, 1982; Coker, 1984; Rocklage, Peschong, Gillett, & Delohery, 1996). However, purchasing or making a switch that is appropriate for a child is only the first step. The next step involves identifying an array of functional and meaningful activities that can be adapted to incorporate the use of single switch technology.

Table 1.
Sample list of commercially available switches.

Manufacturer	Phone Number	Web Address
AbleNet, Inc.	800-322-0956	www.ablenetinc.com
Access First, Inc.	888-606-6769	www.accessfirst.net
Adaptivation, Inc.	800-723-2783	www.adaptivation.com
Crestwood Communication Aids, Inc.	414-352-5678	www.commicationaids.com
Don Johnston, Inc.	800-999-4660	www.donjohnston.com
Enabling Devices, a division of Toys for Special Children, Inc.	800-832-8697	www.enablingdevices.com
Luminaud, Inc.	800-255-3408	www.luminaud.com
Mayer-Johnson, Inc.	800-588-4548	www.mayer-johnson.com
Prentke Romich Company	800-262-1984	www.prentrom.com
Words +, Inc.	800-869-8521	www.words-plus.com
ZYGO Industries, Inc.	800-234-6006	www.zygo-usa.com

Adaptable Single Switch Activities

One stumbling block that is frequently encountered when attempting to infuse the use of

switches into an environment is having only one or two toys/activities that are operated by single switches. This may be problematic for a number of reasons. First, it limits the number of opportunities for switch use, which may influence the rate of skill acquisition. Second, the use of only a few different activities may influence the generalization of skills. Third, using only one or two activities as contexts for teaching may result in boredom on the part of the switch user.

Battery-Operated Devices. There are a number of battery-operated devices appropriate for use by young children. These include machines that make bubbles; animals that make noises, do tricks, and dance; vehicles with sounds, lights and motion; and mirrors with lights that turn on and off. Simple modifications are necessary in order to use battery-operated devices with a single switch. There are three common ways to make these modifications. One strategy is to modify the existing button used to activate the toy. For example, a digitized picture frame (i.e., a picture frame that allows a short message to be recorded and then played back by pressing a button) can be modified by gluing a larger button onto the existing one so that the child can press it more easily.

A second strategy is to use a battery interrupter. This is a device that fits into the toy's battery compartment to make it switch accessible. Battery interrupters are relatively inexpensive and are available from many of the single-switch manufacturers listed in Figure 1. One advantage to using battery interrupters is that they are not difficult to install. Furthermore, the use of a battery interrupter is a temporary modification. The toy can be returned to its original state when the interrupter is removed.

An alternative to using a battery interrupter is to permanently modify the device for switch access. This is accomplished by rewiring the toy and installing a switch jack. Rocklage, Peschong, Gillett, & Delohery (1996) provide instructions for modifying toys to allow for switch access. An advantage of modifying a toy for switch access is that in so doing, it eliminates the need for a battery interrupter. This may make the use of the switch easier from the caregiver's perspective. This may be an important consideration in busy environments or when caregivers are timid about the use of technology. However, it is important to note that modifying devices is a permanent transformation which usually takes some time and knowledge to successfully modify.

Electronic Devices. There are a number of electronic devices that, with supervision, are appropriate for use by young children. These include blenders, mixers, popcorn poppers, juicers, radios, televisions, holiday lights, lava lights, tape recorders, slide projectors, movie projectors, stereos, radios, tape players, and CD players. In order to use a switch to power an electrical device, a switch interface is needed. A switch interface serves as a link that enables the switch to turn on an electrical device. It is very simple to use and involves plugging the switch and the electronic device into the interface, and then plugging the interface into the wall outlet. One frequently used switch interface is the Power Link 2 by AbleNet.

Computers. The increased use of computers in educational and home settings has resulted in the development of a wide variety of computer software programs for young children. Some of this software can be operated via single switch technology and provide cause and effect activities. One example is Eensy & Friends (Don Johnston, 1994-1995), which provides children with the opportunity to practice directional concepts, number identification, and counting skills while playing along with nursery rhymes. Other software has a built-in scanning option that allows choices to be displayed in the software. The child then touches his/her switch to indicate a choice. One example of this is Millie & Bailey Preschool (Riverdeep, 2000) where children engage in activities such as rhyming, counting, and composing artwork.

In order to use a single switch to operate a computer one must use a peripheral. A peripheral is an adjunct to a computer that supports computer use. Don Johnston, Inc., R. J. Cooper, and Intellitools sell peripherals that support single switch use. Table 2 provides the addresses and phone numbers of each of these companies.

Summary

In summary, there are a wide range of toys and activities that can be operated with single switches. The activities may involve the use of battery-operated toys, electrical devices, and/or computer software. Incorporating a large number of toys and activities increases the number of opportunities for switch use that may enhance the rate of skill acquisition, as well as the generalization of skills. Finally, using multiple toys and activities as contexts for teaching may decrease the likelihood that the child will become bored. However, knowing the range of potential activities that can be engaged in with the help of single switches is only part of the battle. Another issue to consider is how to identify and infuse the use of single switches throughout a child's day.

Table 2.
Sample peripheral manufacturers.

Product/Manufacturer	Phone Number	Web Address
Discover:Kenx™ Madentec Limited	800-999-4660	www.madentec.com
IntelliKeys® IntelliTools, Inc.	800-899-6687	www.intellitools.com
S.A.M. R.J. Cooper	800-752-6673	www.rjcooper.com

The Identification and Infusion of Single Switch Technology

Lueck, Dote-Kwan, Senge, and Clarke (2001) list factors that must be considered before identifying assistive technology (e.g., single switches) that best meets the needs of an individual with disabilities. These factors include the tasks that the individual wants/needs to perform, and the relationship between the tasks and the individual's preferences and abilities. As the child's IEP team considers these factors, it is also necessary to plan for the infusion of the use of the AT throughout the child's day in order to promote the acquisition and generalization of skills. One strategy that has helped in planning for this infusion is a schedule matrix. Table 3 illustrates the use of a matrix for infusing single switch activities for a 4-year-old child, Leah. Leah has severe multiple disabilities and receives special education, speech/language, and occupational therapy services in her preschool classroom. Observation of Leah in her classroom environment reveals that she shows limited participation in activities, often just watches other children or moves from one area of the classroom to another, and does not have a symbolic means of communication. Leah's IEP team decided to provide more classroom participation opportunities for Leah to communicate with her peers. Table 3 illustrates the numerous ways in which single switches were used throughout Leah's school day to address each of these goals.

Conclusion

In summary, single switch technology can provide the means for adapting activities to meet children's diverse needs (Brett, 1995). The use of AT provides several benefits for young children with and without disabilities (Clements, 1987; Clements, Nastasi, & Swaminathan, 1993). For example, significant gains have been documented in the areas of creativity, language development, mathematic achievement, higher order thinking skills, problem solving abilities, and prereading/reading skills (Clements, 1987; Clements, Natasi, & Swaminathan, 1993; Swick, 1989). Significant gains have also been documented in the areas of emotional development, motor skills, and social skills (Clements, 1987; Haugland, 1996; King & Alloway, 1992; Swick, 1989). Single-switches are one example of AT that can be used to help children with disabilities increase their independence and control over their environment. When used properly, single switches can serve multiple purposes and can be used in a variety of developmentally appropriate situations.

References

Brett, A. (1995). Technology in inclusive early childhood settings. *Day Care & Early Education, 22* (3), 8-11.

Burkhart, L. (1980). *Homemade battery-powered toys and educational devices for severely handicapped children.* (Available: http://www.lburkhart.com)

Table 3.
The infusion of single switch technology.

Schedule	Switch Activity	Materials Needed
Arrival	-Leah will use a digitized picture frame to share what happened at home last night with teachers and peers.	-digitized picture frame with adapted "play" button, symbol representing "What I did at home," sibling or parent to record message for Leah
Circle Time	-Leah will use tape recorder to activate recording of the opening song.	-tape recorder, switch interface, switch, tape of opening song
Free Choice: Art Activity	-Children at this center will take turns using an electric fan to "blow" paint across paper to make the limbs of trees.	fan, switch interface, switch, brown paint, large white paper
Literacy Center	-Children at this center will take turns using computer software containing favorite books.	-computer, peripheral, switch, software
Blocks	-Leah will use a tape recorder for books on tape (peer will turn pages, Leah will start and stop tape). -Children at this center will take turns using a battery operated bulldozer to move blocks and knock down block towers.	-tape recorder, switch interface, switch, books on tape, book -bulldozer, battery interrupter, switch, blocks
Snack	-Children will take turns using appliances (e.g., mixer) to prepare snacks.	-appliances, switch interface, switch, ingredients for snack
Naptime	-"Naptime" helper will turn off lights (set timer for lights to turn on again at designated time).	-switch interface, switch, electric lamp(s)
Outdoor Play	-Children will take turns activating red or green holiday lights for game of "Red Light – Green Light."	-switch interface, switch, red and green holiday lights
Departure	-Leah will use a digitized picture frame to share what happened at school with her parents.	-Digitized picture frame with adapted "play" button, symbol representing "What I did at school," peer to record message for Leah

Burkhart, L. (1982). *More homemade battery devices for severely handicapped children with suggested activities.* (Available: http://www.lburkhart.com)

Clements, D.H. (1987). Computers and young children: A review of research. *Young Children, 43*(1), 34-44.

Clements, D.H., Nastasi, B.K., & Swaminathan, S. (1993). Young children and computers: Crossroads and directions from research. *Young Children, 48*(2), 56-64.

Coker, W.B. (1984). Homemade switches and toy adaption for early training with nonspeaking persons. *Language, Speech, and Hearing Services in the Schools, 15*(1), 32-36.

Eensy & Friends™ [Computer software]. Wauconda, IL: Don Johnston.

Glennan, S.L., & Decoste, D.C. (Eds.) (1996). *Handbook of augmentative and alternative communication.* San Diego: Singular.

Haugland, S. (1996). Enhancing children's sense of self and community through utilizing computers. *Early Childhood Education Journal, 23*(4), 227-230.

King, J., & Alloway, N. (1992). Preschooler's use of microcomputers and input devices. *Journal of Educational Computing Research, 8*(4), 451-468.

Lueck, A.H., Dote-Kwan, J., Senge, J.C., & Clarke, L. (2001). Selecting assistive technology for greater independence. *Re:View, 33*(1), 21-33.

Millie & Bailey Preschool® [Computer software]. Cambridge, MA: Riverdeep.

Rocklage, L.A., Peschong, L., Gillett, A.L., & Delohery, B.J. (1996). *Good junk + creativity = great low-end technology!* (Available from L.A. Rocklage, P.O. Box 971022, Ypsilanti, MI, 48197).

Swick, K.J. (1989). Appropriate uses of computers with young children. *Educational Technology, 29*(1), 7-13.

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If you have an assistive technology topic or product that you would like to see covered or if you are interested in being a guest writer, please send your comments to:

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